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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/864,376	05/25/2001	Tadahiro Ohmi	107176-00007	1605

7590 09/28/2005

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EXAMINER	
ZERVIGON, RUDY	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 09/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/864,376	OHMI ET AL.	
	Examiner	Art Unit	
	Rudy Zervigon	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9,12-14 and 16-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,12-14 and 16-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1-5, 7, 8, 9, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuda; Mitsuo et al (U.S. 5,134,965 A) in view of Otsubo et al (USPat. 4,985,109). Tokuda teaches a plasma processing apparatus (Figure 13) including:

i. A processing chamber (6, Figure 13; column 13, line 16 - column 14, line 5)

ii. A microwave slot antenna (34, Figure 13; column 13, line 16 - column 14, line 5) radiating antenna / radiating surface (lower surface of 34, Figure 13)

iii. A plate-shaped dielectric body (5, Figure 13; column 13, line 16 - column 14, line 5)

iv. A distance "D" (" t ", Figure 13; column 11; lines 11-25) between the microwave radiating antenna surface (lower surface of 34, Figure 13) and a surface (upper surface of 5; Figure 13) of the dielectric body (5, Figure 13; column 13, line 16 - column 14, line 5) is shown by Tokuda et al in Figure 2

v. Tokuda et al teaches a dielectric plate as discussed above

vi. Tokuda further teaches the plasma (column 3; lines 58-67) is formed between the plasma exciting surface (lowest surface of 5, Figure 13; column 13, line 16 - column 14, line 5) and the object (8; Figure 13) to be processed – claim 1

vii. Tokuda further teaches forming a standing wave microwave (column 14; lines 30-45) between Tokuda's microwave radiating surface (lower surface of 34, Figure 13) and his

plasma exciting surface (lowest surface of 5, Figure 13; column 13, line 16 - column 14, line 5).

viii. Tokuda further teaches relative spacing (" t ", Figure 13; column 11; lines 11-25) between Tokuda's plate-shaped dielectric body (5, Figure 13; column 13, line 16 - column 14, line 5) and Tokuda's plasma radiating surface (lower surface of 34, Figure 13).

Tokuda does not teach a specific thickness "d2" (Applicant's Figure 1) for his dielectric plate. Tokuda does not teach a slot antenna where a part of the number of slots is closed.

Otsubo teaches a concentric slot antenna (Figure 2) in a microwave plasma reactor (Figure 1) having a number of slots (5a) formed and distributed in the microwave radiating surface where a part of the number of slots can be closed (column 7, lines 3-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Tokuda to optimize the relative positions of Tokuda's dielectric plate (5, Figure 13; column 13, line 16 - column 14, line 5) with Tokuda's microwave slot antenna (34, Figure 13; column 13, line 16 - column 14, line 5), inclusive, to replace Tokuda's microwave slot antenna with Otsubo's slot antenna.

Motivation Tokuda to optimize the relative positions of Tokuda's dielectric plate (5, Figure 13; column 13, line 16 - column 14, line 5) with Tokuda's microwave slot antenna (34, Figure 13; column 13, line 16 - column 14, line 5), inclusive, to replace Tokuda's microwave slot antenna with Otsubo's slot antenna is for optimizing the space "between the slot antenna and the quartz

window 4 through which the microwaves pass so that the microwaves emitted from the slot antenna have room to expand" (column 9, lines 6-30) as taught by Otsubo, further, motivation for Tokuda to use Otsubo's slot antenna under standing wave microwave propagation is for "easy" plasma generation as taught by Otsubo (column 19, lines 35-40). Further, it is well established that the rearrangement of parts is considered obvious to those of ordinary skill (In re Japikse , 181 F.2d 1019, 86 USPQ 70 (CCPA 1950); In re Kuhle , 526 F.2d 553, 188 USPQ 7 (CCPA 1975); Ex parte Chicago Rawhide Manufacturing Co. , 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984).; MPEP 2144.04)

3. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuda; Mitsuo et al (U.S. 5,134,965 A) and Otsubo et al (USPat. 4,985,109) in view of Tsuchihashi, Masaaki et al (USPat. 6,109,208). Tokuda and Otsubo are discussed above. Tokuda and Otsubo do not teach plural slots of the microwave radiating antenna where the plural slots in the peripheral direction are closed. Tsuchihashi teaches a similar microwave plasma generating device (Figure 20, 21; column 11, lines 37-49) including plural slots ("slits" 6a-d, 10a-d) in the peripheral direction of the shutter antenna (26) where portions of the slots ("slits" 6a-d) in the peripheral direction can be opened ("A" direction; Figure 20) or closed (counter to "A" direction; Figure 20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Tokuda and Otsubo's microwave radiating antenna with Tsuchihashi's shutter antenna as taught by Tsuchihashi.

Motivation to replace Tokuda and Otsubo's microwave radiating antenna with Tsuchihashi's shutter antenna as taught by Tsuchihashi is for distributing microwaves as taught by Tsuchihashi to form high density plasmas (column 11, lines 37-49).

4. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuda; Mitsuo et al (U.S. 5,134,965 A) and Otsubo et al (USPat. 4,985,109) in view of Tsuchihashi, Masaaki et al (USPat. 6,109,208). Tokuda and Otsubo are discussed above. Tokuda and Otsubo do not teach plural slots of the microwave radiating antenna where the plural slots in the peripheral direction are closed.

Tsuchihashi teaches a similar microwave plasma generating device (Figure 20, 21; column 11, lines 37-49) including plural slots ("slits" 6a-d, 10a-d) in the peripheral direction of the shutter antenna (26) where portions of the slots ("slits" 6a-d) in the peripheral direction can be opened ("A" direction; Figure 20) or closed (counter to "A" direction; Figure 20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Tokuda and Otsubo's microwave radiating antenna with Tsuchihashi's shutter antenna where portions of the slots in the peripheral direction can be opened or closed as taught by Tsuchihashi.

Motivation to replace Tokuda and Otsubo's microwave radiating antenna with Tsuchihashi's shutter antenna where portions of the slots in the peripheral direction can be opened or closed as taught by Tsuchihashi is for distributing microwaves as taught by Tsuchihashi (column 11, lines 37-49).

5. Claims 16-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuda; Mitsuo et al (U.S. 5,134,965 A) in view of Otsubo et al (USPat. 4,985,109). Tokuda is discussed above. Tokuda further teaches a plasma processing apparatus (Figure 13) including a microwave (34, Figure 13; column 13, line 16 - column 14, line 5) radial line (Figure 15) slot radiating antenna / radiating surface (lower surface of 34, Figure 13)

Tokuda does not teach a specific thickness "D" (" t ", Figure 13; column 11; lines 11-25) for his dielectric plate. Tokuda does not teach a slot antenna where a part of the number of slots is closed.

Otsubo teaches a slot antenna (Figure 2) in a microwave plasma reactor (Figure 1) having a number of slots (5a) formed and distributed in the microwave radiating surface where a part of the number of slots can be closed (column 7, lines 3-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Tokuda to optimize the thickness of the dielectric plate, and for Tokuda to use Otsubo's slot antenna, with Tokuda's radial line slot configuration.

Motivation for Tokuda to optimize the thickness of the dielectric plate, and for Tokuda to use Otsubo's slot antenna, with Tokuda's radial line slot configuration is for "easy" plasma generation as taught by Otsubo (column 19, lines 35-40) and circular TE_1 microwave generation for uniform and high density plasmas as taught by Tokuda (column 9, lines 7-30).

Response to Arguments

6. Applicant's arguments filed July 11, 2005 have been fully considered but they are not persuasive.

7. Applicant states:

"

In particular, it is submitted that Tokuda fails to disclose at least that the plasma exciting surface substantially coincides with the surface of the dielectric body facing away from the microwave radiating surface. For instance, nowhere does Tokuda show or disclose the "plasma exciting surface" as recited in the present claimed invention.

"

The Examiner disagrees. Specifically, Tokuda clearly shows Tokuda's plasma exciting surface (lowest surface of 5, Figure 13; column 13, line 16 - column 14, line 5) substantially coincides with Tokuda's surface of the dielectric body (5, Figure 13; column 13, line 16 - column 14, line 5) facing away from the microwave radiating surface (lower surface of 34, Figure 13). Applicant's own "plasma exciting surface" is defined in the specification as "...the lower surface (capable of being regarded substantially as the plasma exciting surface) of the dielectric plate 2" ([0035]).

Applicant states:

"

In addition, Applicants submit that Tokuda fails to show at least "a standing wave of the microwave is formed between the microwave radiating surface and a plasma exciting surface" and "the standing wave is not entering the plasma." According to the Office Action, the Examiner characterized Tokuda as allegedly showing "forming a standing wave ..." and cited columns 13 and 14 to support the characterization. Applicants respectfully disagree with the Examiner's characterization since the disclosure of Tokuda does not show at least, for example, where the standing wave is formed.

"

In response, the Examiner again cites Tokuda's specific, unambiguous, teaching of where Tokuda's standing wave is formed:

"Because the energy of the microwave radiated through the slots 34a changes according to the distribution of the electric field intensity formed by the standing wave in the cavity

resonator...Therefore, the lower cavity resonator chamber 20a and the lower slot plate 32 are provided to make the distribution of the standing wave in the lower cavity resonator chamber 20a relatively uniform compared with that in the upper cavity resonator chamber 20b. As a result, the distribution in energy of the microwave radiated into the plasma generating chamber 6 through the slots 32a is made to be more uniform. " (column 14; lines 30-45). From Tokuda, we learn that his "standing wave" is formed in both the upper cavity resonator chamber 20b and in the upper cavity resonator chamber 20a. As a result, Tokuda teaches forming a standing wave microwave (column 14; lines 30-45) between Tokuda's microwave radiating surface (lower surface of 34, Figure 13) and his plasma exciting surface (lowest surface of 5, Figure 13; column 13, line 16 - column 14, line 5).

Applicant states:

"

In contrast, the value ranges stated in claims of the present application provide a condition to form a good standing wave between the microwave radiating surface and the plasma exciting surface.

"

The Examiner's citations of Tokuda also demonstrate that Tokuda is similarly concerned with values of "t" to provide a condition to form a good standing wave (column 14; lines 30-45) between Tokuda's microwave radiating surface (lower surface of 34, Figure 13) and Tokuda's plasma exciting surface (lowest surface of 5, Figure 13; column 13, line 16 - column 14, line 5).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the

teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, motivation for Tokuda to optimize the relative positions of Tokuda's dielectric plate (5, Figure 13; column 13, line 16 - column 14, line 5) with Tokuda's microwave slot antenna (34, Figure 13; column 13, line 16 - column 14, line 5), inclusive, to replace Tokuda's microwave slot antenna with Otsubo's slot antenna is for optimizing the space "between the slot antenna and the quartz window 4 through which the microwaves pass so that the microwaves emitted from the slot antenna have room to expand" (column 9, lines 6-30) as taught by Otsubo, further, motivation for Tokuda to use Otsubo's slot antenna under standing wave microwave propagation is for "easy" plasma generation as taught by Otsubo (column 19, lines 35-40). Further, it is well established that the rearrangement of parts is considered obvious to those of ordinary skill (In re Japikse , 181 F.2d 1019, 86 USPQ 70 (CCPA 1950); In re Kuhle , 526 F.2d 553, 188 USPQ 7 (CCPA 1975); Ex parte Chicago Rawhide Manufacturing Co. , 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984).; MPEP 2144.04).

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272.1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (703) 872-9306. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.